

Ionic Liquids Enabling Revolutionary Closed-Loop Life Support

Completed Technology Project (2016 - 2017)



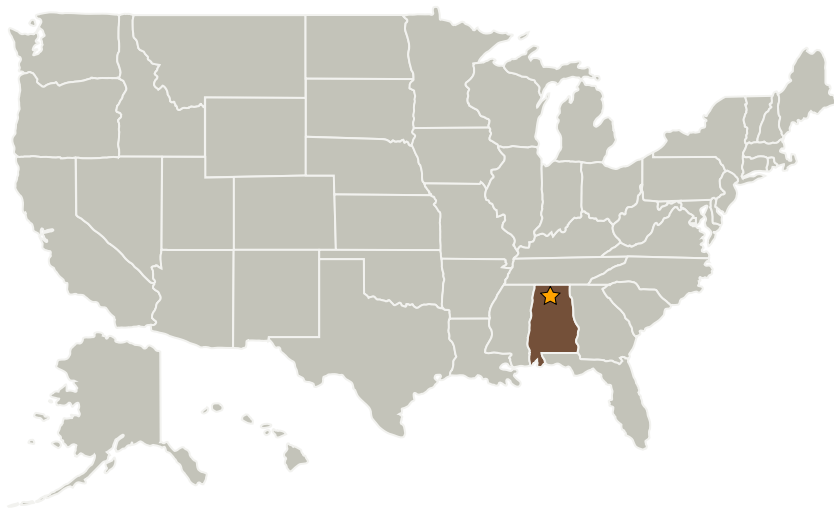
Project Introduction

The innovation is to utilize ionic liquids with the Bosch process to achieve closed-loop life support. Specific tasks are to: 1) Advance the technology readiness of a proposed oxygen recovery life support technology to TRL 3, 2) To generate the data necessary to scale the proposed technology, and 3) To generate a system concept and basic designs.

Anticipated Benefits

Development of a revolutionary implementation of the Bosch process using ionic liquids (IL) that can theoretically achieve 100% oxygen recovery save over a ton of mass resupply over a 3-year Martian surface mission. Life Support systems for long duration life support must be highly reliable, robust against environmentally-induced failures, and require limited resupply and crew interaction. An oxygen recovery system on ISS recovers ~50% of the oxygen from this CO₂ and recycles it back to the crew, thereby reducing the required resupply of O₂ from Earth. Future missions will require a minimum of 75% oxygen recovery with a target of >90% oxygen recovery from metabolic CO₂ to limit resupply mass and logistical requirements.

Primary U.S. Work Locations and Key Partners



Fe-plated Cu puck post carbon regeneration (above) and the regenerated Feplated Cu puck after electroplating (below).

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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations

Alabama

Images



Project Image

Fe-plated Cu puck post carbon regeneration (above) and the regenerated Fe-plated Cu puck after electroplating (below).

(<https://techport.nasa.gov/image/35795>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Center Innovation Fund: MSFC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

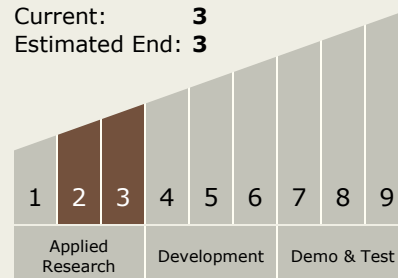
John W Dankanich

Principal Investigator:

Walter F Schneider

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



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Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.2 Mission Infrastructure, Sustainability, and Supportability
 - └ TX07.2.1 Logistics Management

Target Destinations

Earth, The Moon, Mars